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Chemical Managament of China Aster (*Callistephus chinensis* L Nees.) Phyllody Disease

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The field trial was laid out at Hort. Research Station of Division of Horticulture, University of Agricultural Sciences, Bengaluru 2013 during China aster growing seasons to evaluate the efficacy of different insecticides viz., Carbofuran, Imidacloprid (Confidor 20%), Thiomethoxam (Actara 25 WG)) and Acetamiprid (Acelan 20% SL) applied individually and in combination at recommended dose for management of phyllody disease. Of the different treatments combined application of carbofuran + imidacloprid + thiomethoxam + acetamiprid was effective against China aster phyllody phytoplasma. Carbofuran was least effective in controlling the phyllody disease incidence.

Keywords: *Callistephus chinensis* (China aster), Phytoplasma, Insecticides, Phyllody.

China aster (*Callistephus chinensis* Nees.) is one of the most popular annual flower crops grown for its flower. It is an important annual crop of our country and grown throughout the world. The genus *Callistephus*is derived from two Greek words *Kalistos* meaning 'most beautiful' and *Stephus*, 'a crown' referring to the flower head (Munikrishnappa *et al*., 2013). The crop is affected by many pests and diseases. Among the various diseases of China aster, phyllody disease is major constraint in flower yield and seed production. The incidence of the disease ranged from 6 to 57 per cent and was characterized by small leaf, short internode, excessive auxillary proliferation and phyllody symptoms. phyllody disease on aster was first reported during 1988 from Bengaluru, India and known to be transmitted by *Orosius albicinctus* (Rangaswamy *et al*., 1988). However little attempts have been made on management of this disease. Therefore, present study was undertaken on management of phyllody disease by spraying with insecticides.

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MATERIALS AND METHODS

The field experiment was laid out at Hort. Research Station of Division of Horticulture, UAS, GKVK, Bengaluru 29th August- 2013. China aster variety kamini seed were sown (Ist week of July) in the nursery bed and raised the seedlings. 21-22 days old seedlings were transplanted in the plot (4.2m x 1.8m) with a row to row distance of 40 cm and plant to plant distance of 20 cm. The five treatment plots were arranged in randomized complete block design (RCBD) with four replications. The package of practices except plant protection were followed as per the package of practices, UAS, Bengaluru. Observations were recorded at 50, 60 and 70 days after transplanting with respect to phyllody disease incidence. To evaluate the efficacy of these insecticides, the number of disease infected plants out of total number of plants (phyllody infected) and seed yield (kg/ha) were recorded in each treatment. The Data thus obtained were subjected to analysis of variance (ANOVA) using statistical software (MSTATC).

Procedure for Insecticide Spray

For foliar treatment, imidacloprid,

acetamiprid and thiomethoxam were diluted with water to obtain the required concentration. Each spray treatment was applied at recommended dose rate either individually or in combination with a hand operated sprayer at 15-20 days interval (Table 1).

RESULTS AND DISCUSSION

The aim of the present study was to evaluate the effectiveness of different insecticides in reducing the incidence of aster phyllody phytoplasma in China aster crops. The efficacy of different treatments were assessed against China aster phyllody under natural field conditions. The results (Table 2) are mean comparison of the data, regarding the treatment effect on incidence of China aster phyllody. Insecticides *viz*., carbofuran, imidacloprid, thiomethoxam and acetamiprid were effective and reducing the incidence of phyllody when applied individually and in combination.

Table1. Details of insecticides used for evaluation of their efficacy against China aster phyllody

Treatment No.	Insecticides		Insecticidal Group	Doses	Method and timing of application
	Common name	Trade name			
T1	Carbofuran3G	Furadan	Carbamate	10Kg/acre	Soil application at the time of transplanting
T2	T1 + Imidacloprid 200SL	Confidor	Neonicotinoid	0.5ml/lit	Foliar spray (15days after imposition of T1)
T3	T1 +T2 + Thiomethoxam 25WG	Actara	Neonicotinoid	0.5g/lit	Foliar spray (15days after imposition of T2)
T4	T1+T2+T3+ Acetamiprid 20%SP	Assail	Neonicotinoid	0.5g/lit	Foliar spray (15days after imposition of T3)
T5	Control	-		-	-

Table 2. Effect of different insecticides on the incidence of China aster phyllody and seed yield

Sl. No.	Treatments	50DAT	60DAT	70DAT	Average disease incidence	Yield (Kg/ha)
T1	Carbofuran3G(10Kg/acre)	9.00(3.08b)	10.5(3.31b)	13.50(3.74b)	11.00(3.38b)	133.24b
T2	T1+ imidacloprid200SL	6.75(2.68c)	7.75(2.87c)	9.00(3.08c)	7.83(2.88c)	155.82c
T3	(0.5ml/L)T1+T2+ thiomethoxam25WG (0.5gm/L)	3.75(2.05d)	4.50(2.23d)	5.50(2.44d)	4.58(2.24d)	173.41d
T4	T1+T2+T3+acetamiprid 20%SL(0.5gm/L)	2.50(1.73e)	3.50(1.99d)	4.25(2.17e)	3.42(1.96e)	179.69d
T5	Control	15(3.94a)	16.5(4.12a)	20.5(4.58a)	17.33(4.21a)	128.50a
	F test	*	*	**	**	*
	S. Em. ±	0.49(0.09)	0.52(0.09)	0.42(0.07)	0.50(0.04)	2.39
	C. D. at 5%	1.52(0.29)	1.60(0.29)	1.29(0.23)	1.62(0.14)	7.36
	C.V. %	13.34(7.01)	12.17(6.44)	7.93(4.68)	9.90(2.53)	4.10

Note- DAT- Days after transplanting. Figures in the parenthesis are the square root transformed values.

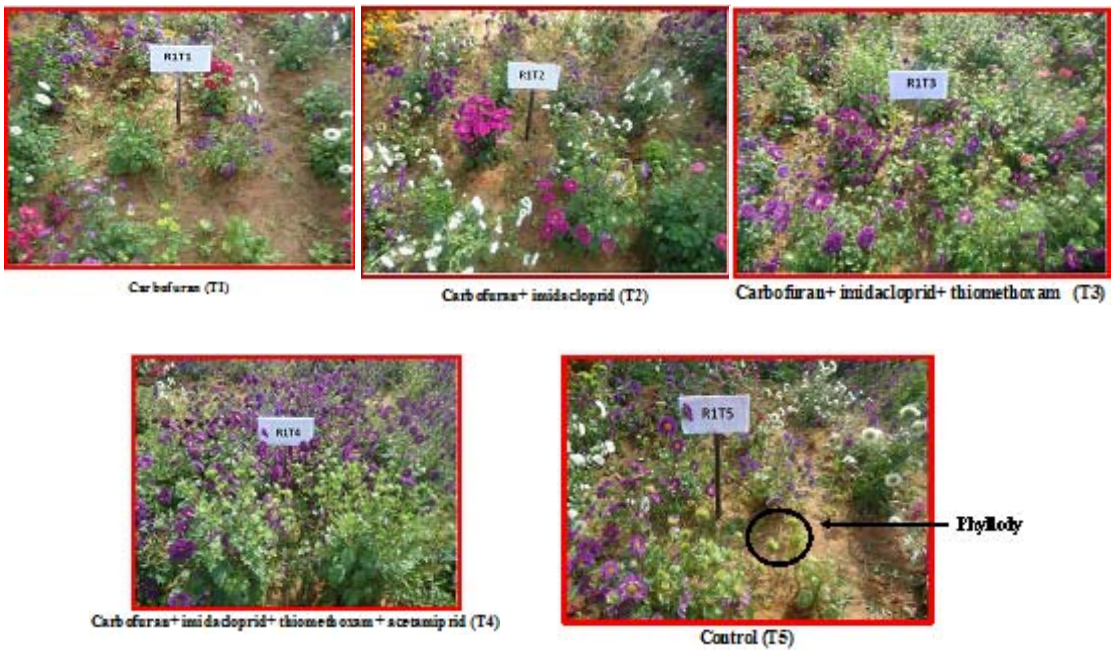

Plate 1. Efficacy of different insecticides on incidence of aster phyllody and seed yield

Result of field trial indicated that all the tested insecticides were effective. Of the different treatments, lowest disease incidence was recorded in T4 (spray with carbofuran + imidacloprid + thiomethoxam + acetamiprid) followed by T3 (spray with carbofuran + imidacloprid + thiomethoxam) application. The maximum seed yield was found in T4 (179.69kg/ha) with combined application of carbofuran+ imidacloprid+ thiomethoxam,+ acetamiprid application which was statically at par with that of T3 (173.41kg/ha) with carbofuran + imidacloprid + thiomethoxam application. The control (T5) showed minimum yield of 128.50kg/ha (Table 2 and Plate 1).

Misrah &Senapati, (2003) reported that imidacloprid was effective against okra jassid. Akbar *et al*. (2012) also found that imidacloprid was most effective in controlling the jassid and potato leaf hopper populations. Besides that El-Dewy (2006) who found that imi-dacloprid (confidor) proved to be a superior compound against aphids, jassids, and whitefly (adult).The results of the present studies disfavored the results of Latif*et al*. (2001) who reported that imidacloprid treated plots had significantly the highest yield followed by acetamiprid. The present findings can partially be compared; with those of Misra (2002) and Solangi and Lohar (2007) who also revealed that Confidor was most effective in controlling the jassid population.

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